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Local Climatological Data

Annual Summary With Comparative Data

1982

CHICAGO, ILLINOIS

O'HARE INTERNATIONAL AIRPORT

Brad

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Narrative Climatological Summary

Chicago is along the southwest shore of Lake Michigan and occupies a plain which, for the most part, is only some tens of feet above the lake. Lake Michigan averages 579 feet above m.s.l. Natural water drainage over most of the City would be into Lake Michigan, and from areas west of the City is into the Mississippi River System. But actual drainage over most of the City is artificially channeled also into the Mississippi system.

Topography does not significantly affect air flow in or near the City except that lesser frictional drag over Lake Michigan causes winds to be frequently stronger along the lakeshore, and often permits air masses moving from the north to reach shore areas an hour or more before affecting western parts of the City.

Chicago is in a region of frequently changeable weather. The climate is predominately continental, ranging from relatively warm in summer to relatively cold in winter. However, the continentality is partially modified by Lake Michigan, and to a lesser extent by other Great Lakes. In late autumn and winter, air masses that are initially very cold often reach the City only after being tempered by passage over one or more of the lakes. Similarly, in late spring and summer, air masses reaching the City from the north, northeast, or east are cooler because of movement over the Great Lakes. Very low winter temperatures most often occur in air that flows southward to the west of Lake Superior before reaching the Chicago area. In summer the higher temperatures are with south or southwest flow and are therefore not influenced by the lakes, the only modifying effect being a local lake breeze. Strong south or southwest flow may overcome the lake breeze and cause high temperatures to extend over the entire City.

During the warm season, when the lake is cold relative to land, there is frequently a lake breeze that reduces daytime temperature near the shore, sometimes by 10° or more below temperatures farther inland. When the breeze off the lake is light this effect usually reaches inland only a mile or two, but with stronger on-shore winds the whole City is cooled. On the other hand, temperatures at night are warmer near the lake so that 24-hour averages on the whole are only slightly different in various parts of the City and suburbs.

In summer a combination of high temperature and humidity may develop, usually building up progressively over a period of several days when winds continue out of the south or southwest, becoming oppressive for one or perhaps several days, then ending abruptly with a shift of winds to northwest or northerly. The change may be preceded or accompanied by thundershowers. High relative humidity often results from wind flow off the lake, but the air is then cooler and not oppressive.

At the O'Hare International Airport temperatures of 96° or higher occur in about half the summers, while about half the winters have minimums as low as -15°. The average date of the first temperature as low as 32° in the fall is October 12 and the average date of the temperature as low as 32° in the spring is April 29 (1959-1972 data). However, temperatures this low have been recorded as early as September 28 in autumn, and as late as May 29 in spring. Normal daily mean temperatures are below 32° for 96 days during winter. The normal heating season is from mid-September to early June. Ninety-four percent of the normal heating load is between October 1 and April 30, and 55 percent during the winter months of December through February. The normal air-conditioning season lasts from about mid-June to early September.

Precipitation falls mostly from air that has passed over the Gulf of Mexico. But in winter there is sometimes snowfall, light inland but locally heavy near the lakeshore, with Lake Michigan as the principal moisture source. The heavy lakeshore snow occurs when initially colder air moves from the north with a long trajectory over Lake Michigan and impinges on the Chicago lakeshore. In this situation the air mass is warmed and its moisture content increased up to a height of several thousand feet. Snowfall is produced by upward currents that become stronger, because of frictional effects, when the air moves from the lake onto land. This type of snowfall therefore tends to be heavier and to extend farther inland in south-shore areas of the City and in Indiana suburbs, where the angle between wind-flow and shoreline is greatest. The effect of Lake Michigan, both on winter temperatures and lake-produced snowfall, is enhanced by non-freezing of much of the lake during the winter, even though areas and harbors are often ice-choked. This type of local heavy snowfall may occur once or a few times in a normal season.

Summer thundershowers are often locally heavy and variable; parts of the City may receive substantial rainfall and other parts none. Longer periods of continuous precipitation are mostly in autumn, winter, and spring. About one-half the precipitation in winter, and about 10% of the yearly total precipitation, falls as snow. Snowfall from month to month and year to year is greatly variable. There is a 50 percent likelihood that the first and last 1-inch snowfall of a season will occur by December 5 and March 20, respectively. The corresponding dates for the first and last 3-inch snowfall are December 24 and March 2. Freezing rain sometimes occurs but is usually light. During the cold season slight melting and refreezing of precipitation is a fairly common hazard to highway traffic.

Channeling of winds between tall buildings often causes locally stronger gusts in the central business area. Also winds are often locally more brisk along the shoreline; otherwise the nickname "windy city" is a misnomer, because the average wind speed is not greater than in many other parts of the United States.

Fog is infrequent. Visibility is much more often restricted by local air pollution, a condition that is worst during the heating season, but which continues throughout the year because of extensive industrial activity. For much of the time in autumn, winter, and spring, smoke and other air pollution is carried away by winds, sometimes rapidly, but on some occasions when there is little or no wind the pollution accumulates, especially during night and early morning hours. Summertime air pollution is less, partly because of lesser output, but also because of better vertical dispersal; on the other hand, on many summer days surface wind flow converges into the city, preventing or impeding horizontal outflow at the ground.

The amount of sunshine is moderate in summer and quite low in winter. A considerable amount of cloudiness, especially in winter, is usually present, but scattered effects. Days in summer with no sunshine are rare. The total sunshine in December, rarely because of shorter days, is usual, a little over one-third the July total.

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MILWAUKEE, WISCONSIN

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Narrative Climatological Summary

The climate of Milwaukee is influenced by the general storms which move eastward across the upper Ohio River valley and the Great Lakes region. Large high pressure systems moving southeastward out of Canada also have a pronounced effect on the Milwaukee climate and it is seldom that a period of more than 2 or 3 days will pass without a distinct change in the weather, particularly during the winter and spring months. Some of the most severe snowstorms, which produce in excess of 10 inches, develop near the Oklahoma Panhandle and pass across northern Indiana about 140 miles south of Milwaukee. Winds shifting to the northwest at upper levels behind one of the Panhandle storms will frequently set the stage for a secondary storm to move rapidly southeastward from Alberta, Canada, to the vicinity of southern Wisconsin. These storms can produce in excess of 6 inches of snow in Milwaukee, however their low water content make them relatively easy to plow by comparison to the Panhandle storms which derive much of their moisture from the Gulf of Mexico source region.

Milwaukee's climate is influenced to a considerable extent by Lake Michigan. This is especially true when the temperature of the Lake water differs considerably from the air temperature. During the spring and early summer, a shift of wind from a westerly to an easterly direction frequently causes a sudden 10° to 15° drop in temperatures. In the autumn and winter the relatively warm water of the Lake prevents nighttime temperatures from falling as low as they do a few miles inland from the shoreline. * see below

The following averages and extremes are based upon the combined weather records made at the former city office in downtown Milwaukee and those made at General Mitchell Field, covering a period from 1871 through 1970.

Milwaukee's annual average temperature for the period of record, 1871 through 1970, was 46.4°. Monthly temperatures average from 20.9° in January to 70.7° in July. The highest temperature ever recorded in the City was 105° on July 24, 1934, and the lowest was -25° on January 9, 1875. The City has an average of 13 days per year when the temperature reaches zero or lower and 132 days when it reaches 32° or lower. Minima of 0° have been recorded as late as March 25, and 32° as late as May 27 in the spring. In the autumn, a low of 32° has been recorded as early as September 20, and 0° as early as November 21. The average number of days per year with the temperature reaching 90° or higher is 8. Consecutive days with readings of 90° or higher seldom exceed 3, although there have been as many as 10.

The average annual precipitation is about 30 inches. About two-thirds of the annual amount occurs during the growing season. Since 1841, the wettest year was 1876 with 50.36 inches, and the driest year was 1901 with 18.69 inches. The long-term average annual snowfall is about 46 inches, but it varies considerably from season to season. During the winter of 1884-85, the snowfall totaled only 11 inches. The 1967-68 season produced 12 inches.

Thunderstorms occur less frequently and with less severity in the Milwaukee area than in areas to the south and west. Hail size is generally 1/2 inch or less, although it has been noted as large as 2 inches in diameter with unusually severe storms. The maximum rainfall which has occurred in a 24-hour period is 5.76 inches in June 1917. As much as 0.79 inch has fallen in 5 minutes, 1.11 inches in 10 minutes, 1.34 inches in 15 minutes, 1.86 inches in 30 minutes, and 2.25 inches in 1 hour.

There are about twice as many cloudy days during the winter as there are during the summer. The average percent of possible sunshine ranges from 40 percent in December to 70 percent in July.

The city office of the Weather Bureau was located in the Federal Building from April 22, 1899 to May 1, 1954, 1/2 mile from the Lake Michigan shore and 1/4 mile from the Milwaukee River. Thermometers and precipitation gages were located on the roof of the building, more than 100 feet above ground.

The airport office is presently located on the second floor of the FAA/National Weather Service Office Building about 600 feet northwest of the Airport Terminal Building at General Mitchell Field. Hygrothermometers and wind equipment are located at the runway intersection. Precipitation gages are located on a ground-level instrument plot in close proximity to the Weather Service Office. The present location is the 4th one at General Mitchell Field and is approximately 3 miles west of the Lake Michigan shore. Lake breeze fronts reach the station much less frequently than at the downtown location. *